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UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

Ex parte MARK J. BEALS, EDGAR J. MARTINEZ, JACOB KIM,
AJAY SUBRAMANIAN, WILLIAM F. SKALENDA,
ROBERT W. ALM, and LEE A. MCMILLAN

Appeal 2017-000041
Application 13/486,340
Technology Center 3600

Before JOHN C. KERINS, EDWARD A. BROWN, and
LYNNE H. BROWNE, *Administrative Patent Judges*.

BROWNE, *Administrative Patent Judge*.

DECISION ON APPEAL

STATEMENT OF THE CASE

Mark J. Beals et al. (Appellants) appeal under 35 U.S.C. § 134 from the rejection of claims 1–20 under 35 U.S.C. § 101, as being directed to non-statutory subject matter. We have jurisdiction under 35 U.S.C. § 6(b).

We affirm.

CLAIMED SUBJECT MATTER

Claims 1, 10, and 18 are independent. Claim 1, reproduced below, illustrates the claimed subject matter:

1. A machine implemented method to analyze a phased array radar system design, the phased array radar system including a phased array antenna having multiple transmit and receive signal paths with each of the transmit and receive signal paths provided from a plurality of individual components, the method comprising:

generating a component model for each of the plurality of individual components of the phased array antenna;

generating a multi-dimensional lookup table (LUT) having entries corresponding to a number of system states of interest of the phased array antenna with each dimension of the multi-dimensional LUT corresponding to a different operational parameter of the phased array antenna swept across a predetermined range of values;

synthesizing a single-channel model of phased array antenna performance for the system design using beamforming techniques, wherein the single channel model is based upon the plurality of component models; and

analyzing a single-channel of the phased array radar system design using the single-channel model of phased array antenna performance.

DISCUSSION

Claims 1–17

Appellants present the same arguments for both independent claims 1 and 10. *See* Br. 4–12. Appellants rely on arguments presented for claims 1 and 10, and, therefore, do not present separate arguments directed to dependent claims 2–9 and 11–17. *Id.* at 14. We, thus, regard claims 1–17 to

be argued as a group. We take claim 1 as illustrative of this group, and claims 2–17 stand or fall with claim 1. *See* 37 C.F.R. § 41.37(c)(1)(iv).

The Examiner determines that claim 1 is directed to non-statutory subject matter based on a judicial exception without adding significantly more to the judicial exception. Non-Final Act. 2. More specifically, the Examiner determines that claim 1 is directed to an abstract idea of generating a component model, generating a multi-dimensional lookup table, and synthesizing a single-channel model. *Id.* The Examiner explains that the idea in claim 1 is similar to the basic concept of manipulating information using mathematical relationships, which has been determined to be an abstract idea. *Id.* at 3. The Examiner further determines that Appellants' claims do not include additional elements that are sufficient to amount to significantly more than the judicial exception because the recited elements such as a memory and a processor are merely generic parts of a machine. *Id.* According to the Examiner: (1) providing memories that store parametric model data in the form of a multi-dimensional look up table is merely insignificant pre-solution activity, (2) providing a list of phased array components to a user and receiving parametric data from a user are merely insignificant steps that are used to input data into a mathematical algorithm, and (3) rendering a result of an analysis is merely insignificant post-solution activity. *Id.* at 3–4.

Appellants contend that claim 1 is not directed to an abstract idea—that claim 1 is not similar to the basic concept of manipulating information using mathematical relationships. Br. 5–6 (citing *Digitech Image Tech., LLC v. Elecs. for Imaging, Inc.*, 758 F.3d 1344 (Fed. Cir. 2014)). Appellants argue that in contrast to the claim in *Digitech*, claim 1 does not recite a

generic technique for combining or manipulating data using mathematical relationships. *Id.* at 6. Appellants contend that claim 1 more specifically requires synthesizing a plurality of component models into a single-channel model using beamforming techniques and, therefore, does not merely organize or manipulate information through mathematical correlations or relationships. *Id.*

Appellants also argue that claim 1 does not recite any mathematical operations or formulas, in contrast to the claims in *Benson*¹ and *Flook*.² *Id.* at 6–8. Appellants contend that claim 1 does not involve any direct calculation or optimization, but instead is directed to single-channel analysis of a multiple-channel system design by reciting a series of steps that are tightly coupled to various physical components of a phased array radar system. *Id.* at 9.

The Supreme Court has set forth “a framework for distinguishing patents that claim laws of nature, natural phenomena, and abstract ideas from those that claim patent-eligible applications of those concepts.” *Alice Corp. Pty. Ltd. v. CLS Bank Int’l.*, 134 S.Ct. 2347, 2355 (2014) (citing *Mayo Collaborative Servs. v. Prometheus Labs, Inc.*, 132 S Ct. 1289, 1294 (2012)). According to the Supreme Court’s framework, we must first determine whether the claims at issue are directed to one of those concepts (i.e., laws of nature, natural phenomena, and abstract ideas). *Id.* If so, we must secondly “consider the elements of each claim both individually and ‘as an ordered combination’ to determine

¹ *Gottschalk v. Benson*, 409 U.S. 63 (1972).

² *Parker v. Flook*, 437 U.S. 584 (1978).

whether the additional elements ‘transform the nature of the claim’ into a patent-eligible application.” *Id.* (internal citation omitted). The Supreme Court characterizes the second step of the analysis as “a search for an ‘inventive concept’ — *i.e.*, an element or combination of elements that is ‘sufficient to ensure that the patent in practice amounts to significantly more than a patent upon the [ineligible concept] itself.’” *Id.* (internal citation omitted).

Claim 1 is directed to a machine implemented *method* of analyzing a phased array radar system *design* comprising the steps of generating a component *model*, generating a multi-dimensional lookup table having entries corresponding to states of interest of a phased array antenna with each dimension corresponding to a *parameter*, synthesizing a single-channel *model*, and analyzing a single-channel of the phased array radar system *design*. Br. 16 (Claims App.). Thus, claim 1 requires collecting and analyzing data (a parameter) via the use of a “machine,” which are generic steps in a method of modeling and designing. In other words, claim 1 is directed to a set of rules performed by a computer (*i.e.*, a mathematical algorithm or a software).

Our reviewing court instructs us that “[s]oftware can make non-abstract improvements to computer technology just as hardware improvements can, and sometimes the improvements can be accomplished through either route.” *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016). We are further instructed that we must determine if “the claims are directed to an improvement to computer functionality versus being directed to an abstract idea, even at the first step of the *Alice* analysis.” *Id.* Thus, software can be patentable where it improves a computer’s

functionality. Here, however, the limitations at issue are not directed to an improvement of a computer's functionality. There is no limitation recited in claim 1 to suggest that, once a model is synthesized and used for analyzing a system design, the machine that implements the claimed steps will be improved in function. Instead, like the claims in *Electric Power Group*, claim 1 is a purported advance in *uses* for existing computer capabilities, not new or improved computer capabilities. *See Electric Power Group, LLC v. Alstom S.A.*, 830 F.3d 1350, 1354 (Fed. Cir. 2016) (emphasis added); *see also id.* at 1353–54 (explaining that an invention directed to the collection, manipulation, and display of data is an abstract process). *See also* Ans. 4 (“synthesizing a single channel model of phased array captures information and data about the channel and is not done using the phased array antenna”). Accordingly, claim 1 is directed to an abstract idea.

In regard to Appellants' attempt to differentiate claim 1 from the claims at issue in *Digitech*, *Benson*, and *Flook*, we agree with the Examiner that while no specific mathematical formula is given for each of the recited steps, the steps are merely a series of mathematical and logic programming steps implemented on a generically recited machine, and they do not improve the function of the machine or the operation of a phased array radar. *See* Ans. 2–3. The process claim in *Digitech* did not recite expressly mathematical formulae or equations. It claimed, in prose, generating two data sets by taking existing information, such as measured chromatic stimuli, spatial stimuli, and device response characteristic functions, and organizing the information into a new form called a device profile. *Digitech*, 758 F.3d at 1350–51. The method claim was determined to be an abstract idea “because it describes a process of organizing information through

mathematical correlations and is not tied to a specific structure or machine.” *Id.* at 1350. The absence of expressly recited mathematical formulae or equations in the claim carried no significance in determining whether the claims as a whole were directed to the abstract idea. *See also Alice*, 134 S. Ct. at 2356–57 (noting that no special significance was given to the fact that one of the claims in *Bilski* reduced hedging to a mathematical formula).

Accordingly, because claim 1 is drawn to a method comprising collecting and analyzing data and is not directed to an improvement of a computer’s functionality, claim 1 is directed to the abstract idea of manipulating information using mathematical relationships by way of a set of rules performed by a computer. Thus, in accordance with the first step of the *Alice* framework, the Examiner correctly finds that claim 1 is directed to an abstract idea.

Appellants next argue that even if claim 1 is directed toward an abstract idea, the combination of elements recited is sufficient to ensure that the claim amounts to significantly more than an abstract idea. Br. 9. Appellants contend that the Examiner fails to explain why certain additional claimed elements do not amount to significantly more than an abstract idea because the Examiner did not discuss the steps of “synthesizing a single-channel model of phased array antenna performance for the system design using beamforming techniques” and “analyzing a single-channel of the phased array radar system design using the single-channel model.” *Id.* at 10.

Appellants argue that claim 1 provides improvements in the field of radar engineering because the claimed structures and techniques allow designers to determine how a radar design will perform under realistic operating conditions. *Id.* at 10–11. Appellants also argue that the recited

steps are not routine and conventional but instead provide an inventive solution to a specific technological problem, making the claim “significantly more” than an abstract idea. *Id.* at 11. According to Appellants, the claimed invention solves a specific technological problem by synthesizing a single channel model using beamforming techniques. *Id.* at 11–12.

Appellants argue that the claimed invention solves the problem of analyzing phased radar systems in a novel manner by using beamforming techniques. *Id.* at 12. Appellants further contend that claim 1 does not merely “generally link” an abstract idea to a technical field because the claim is limited to the field of phased array radar engineering. *Id.*

Claims must include additional features that are significantly beyond “well-understood, routine, conventional activity” or a simple “instruct[ion] . . . to implement [or apply] the abstract idea [on a computer].”

Ultramercial, Inc. v. Hulu, LLC, 772 F.3d 709, 715 (Fed. Cir. 2014) (quoting *Mayo*, 566 U.S. at 79); *Bascom Glob. Internet Servs., Inc. v. AT&T Mobility LLC*, 827 F.3d 1341, 1349 (Fed. Cir. 2016). Although claim 1 sets forth specific data to be collected (by generating a component data for each of the plurality of individual components of the phased array antenna; by generating a multi-dimensional lookup table from the states of interest of the phased array system and operational parameters of the phased array antenna; and by synthesizing a single-channel of phased array antenna performance for the system design), and indicates that an algorithm is to be used to manipulate the collected data (the machine implemented method comprising the recited steps of collecting and analyzing the data and synthesizing a model), the Examiner’s determination that claim 1 does not specify how the data is used directly on an array antenna to improve the functioning of the

array antenna itself is correct. *See* Ans. 3–4; *see also* Br. 16 (Claims App.). As such, claim 1 at most requires only “mathematical algorithms to manipulate existing information to generate additional information.” *Digitech*, 758 F.3d at 1351. Thus, the limitations of claim 1 do not transform the abstract idea embodied in the claim. Rather, it simply implements the idea.

Although claim 1 requires using beamforming to synthesize a single-channel model and analyzing a single channel of the phased array radar system design using the single-channel model of phased array antenna performance, as noted by the Examiner, these steps are either merely insignificant pre-solution activity, insignificant steps used to input data into a mathematical algorithm, or insignificant post-solution activity. *See* Non-Final Act. 3–4; *see also Flook*, 437 U.S. at 590 (“The notion that post-solution activity, no matter how conventional or obvious in itself, can transform an unpatentable principle into a patentable process exalts form over substance”); *cf. Mayo*, 132 S. Ct. at 1298 (“Purely ‘conventional or obvious’ ‘[pre]-solution activity’ is normally not sufficient to transform an unpatentable law of nature into a patent-eligible application of such a law”). Providing an analysis, without more, is more appropriately characterized as an insignificant “post-solution activity” that does not support the invention having an inventive concept. *See Flook*, 437 U.S. at 590. Like the *Flook* claims, claim 1 does not recite either unconventional physical elements or a functional relationship between abstract and physical elements. *See* Non-Final Act. 3–4; *see also* Ans. 4.

Concerning Appellants’ contention that the claimed invention solves the problem of analyzing phased radar systems in a novel manner by using

beamforming techniques (Br. 12), even assuming that claim 1 is “a novel and nonobvious modification,” as the Supreme Court has stated, “[t]he ‘novelty’ of any element or steps in a process, or even of the process itself, is of no relevance in determining whether the subject matter of a claim falls within the § 101 categories of possibly patentable subject matter.” *Diamond v. Diehr*, 450 U.S. 175, 188–89 (1981). Thus, we are not apprised of error based on this argument.

To the extent that Appellants are arguing that the claims do not preempt because they are limited to the field of phased array radar engineering (Br. 12), this argument is unpersuasive. In *Electric Power Group*, the court noted that a field-of-use restriction, “limiting the claims to the particular technological environment of power-grid monitoring,” is insufficient. *Electric Power Group*, 830 F.3d at 1354. Further, “[w]hile preemption may signal patent ineligible subject matter, the absence of complete preemption does not demonstrate patent eligibility.” *Ariosa Diagnostics, Inc. v. Sequenom, Inc.*, 788 F.3d 1371, 1379 (Fed Cir. 2015).

Accordingly, claim 1, when considered “both individually and ‘as an ordered combination,’” amounts to nothing more than an attempt to patent the abstract idea embodied in the steps of the claim. *See Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 78). Thus, the limitations of claim 1 fail to transform the nature of the claim into patent-eligible subject matter. *See id.* (citing *Mayo*, 566 U.S. at 78). *See also* Ans. 3.

For these reasons, we sustain the Examiner’s decision rejecting claims 1, and claims 2–17 which fall therewith, as being directed to non-statutory subject matter.

Claims 18–20

Appellants do not present separate arguments directed to dependent claims 19 and 20. Br. 13–14. We, thus, regard claims 18–20 to be argued as a group. We take claim 18 as representative of this group, and claims 19 and 20 stand or fall with claim 18.

The Examiner’s rejection of claim 18 is substantially the same as the rejection of claim 1. *See* Non-Final Act. 2–4, Ans. 2–5.

Appellants contend that claim 18 is directed to patent-eligible subject matter for the same reasons as discussed for claim 1. Br. 13. Accordingly, Appellants’ contention in regard to claim 18 is unconvincing for the reasons discussed *supra*.

Appellants further contend that, in regard to claim 18, the recitation of “a Communications System Engineering Tool (COMSET)” is sufficient to ensure that the claim amounts to significantly more than an abstract idea. *Id.* (citing *DDR Holdings, LLC v. Hotels.com, L.P.*, 733 F.3d 1245, 1249 (Fed. Cir. 2014)). Appellants contend that by expressly including COMSET, the claimed invention is necessarily rooted in computer technology. According to Appellants, claim 18 further improves upon the COMSET analysis tool by adding the capability of analyzing a phased array radar design using the particular sequence of steps recited in the claim. *Id.*

As discussed *supra*, the inclusion of additional features that are not significantly beyond “well-understood, routine, conventional activity” or a simple “instruction to implement or apply the abstract idea on a computer,” does not render the claim patent eligible. *See Ultramercial*, 772 F.3d at 715. As the Examiner explains, “while a COMSET is a specific type of computer[,] it is still generically recited and only performs the data

gathering, and mathematical and logic steps recited in the claim.” Ans. 5. Thus, recitation of COMSET in claim 18 merely relates to the use of a machine or an algorithm for data collection and processing, i.e., a “well-understood, routine, conventional activity” that does not amount to significantly more than the abstract idea of manipulating information using mathematical relationships.

Accordingly, claim 18, when considered “both individually and ‘as an ordered combination’” (*Alice*, 134 S. Ct. at 2355 (quoting *Mayo*, 566 U.S. at 78)), amounts to nothing more than an attempt to patent the abstract idea embodied in the functional limitations of the claim. The limitations of claim 18 fail to transform the nature of the claim into patent-eligible subject matter.

For these reasons, we sustain the Examiner’s decision rejecting claim 18, and claims 19 and 20 which fall therewith, as being directed to non-statutory subject matter.

DECISION

The Examiner’s rejection of claims 1–20 is AFFIRMED.

No time period for taking any subsequent action in connection with this appeal may be extended under 37 C.F.R. § 1.136(a). *See* 37 C.F.R. § 1.136(a)(1)(iv).

AFFIRMED